

Scientific Herald of Uzhhorod University

Series "Physics"

Journal homepage: <https://physics.uz.ua/en>

Issue 55, 2549–2558

Received: 19.10.2023. Revised: 01.02.2024. Accepted: 08.03.2024



DOI: 10.54919/physics/55.2024.254so9

Environmental education as part of the training of future biologists at the university

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Abstract

Relevance. The relevance of this study is determined by the development of environmental and pedagogical competence in the training of future biology teachers in higher education institutions. The man-nature relationship must be introduced into the education system as a priority in the hierarchy of values, a component of the versatile development of the individual.

Purpose. The purpose of this study is to discover ways and create methods for the development of environmental competence, which require environmental education and orient biology students towards a rational relationship between humans, nature, and the profession of a biology teacher.

Methodology. Identification of organisational and methodological conditions contributes to the formation of environmental and pedagogical competence in the process of professional training of future biology teachers. The leading method of study is a pedagogical experiment.

Results. The experiment revealed ways to develop environmental and pedagogical competence of students of biological specialties, educational programme - "Teacher Training in Natural Science". The main environmental components of the competence are identified and the motivation for the development of the competence stated in the subject is substantiated. The materials of the study are of practical value in the education system preparing future biology teachers in higher education institutions, through environmental education both for students and educators. Their students live in the modern world, in this regard, the conditions of the environment in which they live will depend on their training.

Suggested Citation:

Zharmenova B, Kurmanbayev R, Tulindinova G, Zhandavletova R, Zhussipbek B. Environmental education as part of the training of future biologists at the university. *Sci Herald Uzhhorod Univ Ser Phys.* 2024;(55):2549-2558. DOI: 10.54919/physics/55.2024.254so9

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Conclusions. The effectiveness of such studies depends not so much on the identified range of challenges outlined in the methodological literature, but rather on the teacher's internal position in the professional activity of promoting students' environmental literacy.

Keywords: ecology; competence; pedagogy; biology students; training in a higher educational institution.

Introduction

The education of natural science teachers is based on the methodology of environmental awareness training. It is aimed at the analysis and implementation of a theoretical model for optimising the learning process of environmental and pedagogical competence formation, which will determine the quality of knowledge and effectiveness of teaching in biology [1]. From a psychological perspective, cognition of nature is seen as a mechanism of internal intellectual and spiritual integration, which results in a reflection of phenomena of social reality [2]. Psychological neoplasms that are formed during the professional training of future biology teachers (knowledge, skills, value orientations and practical activities) are formed as personal qualities of each student [2]. A person's desire to live in environmentally friendly and safe conditions determines their stand on environmental issues, the content of which comprises responsibility for the results of their life activities and their impact on the environment, which is embedded in the content of education as a component of environmental competence. Thus, for the education sector, environmental competence is a set of normative regulations for student training in the area of preservation of a liveable environment [3]. Students' environmental and pedagogical competence is a result of the integrated general cultural indicator of a developed society facilitated by the multifaceted educational work of educational institutions.

The socio-cultural situation in the modern world has redefined the role of the teacher in their work, from narrowly professional subject activity to increase the measure of responsibility for the formation of environmental competence in the younger generation as an element of the professional competence of the biology major.

The development of ecological and pedagogical competence among students of biological specialities during their training in higher education institutions has been addressed by both local [1; 3-5] and Western European scientists [6-10]. The author considers environmental and pedagogical competence as a complex of integrated personal qualities, formed in the process of mastering theoretical knowledge, and practical skills in ecology, which determines the professional behaviour of a future biologist through the position of adequate choice of expediency of preservation of the environment. The concept of environmental and pedagogical competence borders on many social, societal and professional systems and spheres of life: educational institutions, media, ecomanagement. However, the lack of modern theoretical developments, the importance for society and the priority of pedagogical solutions determined the relevance of this study.

According to the author of the study, the development of environmental and pedagogical competence of a future teacher is based on the approach, in which the personal qualities of a student, contributing to the formation of

environmental culture during the educational process, are formed in addition to professional ones. Accordingly, the model of the personality-oriented course "Ecological Education of Students" is developed for students of biological specialities, the complex approach of which consists of conceptual provisions and principles of theoretical aspects of pedagogical technologies. When creating this course, the author of the study identified the essential elements of ecological literacy for students: cognitive, motivational-activity, emotional-evaluative, value-semantic, and aesthetic. These components characterise the formation of environmental skills and abilities.

While teaching the course "Environmental education of students" the teacher uses a number of pedagogical techniques aimed at addressing problem situations: testing, brainstorming (discussions, creative assignments), analysis of scientific literature through the prism of "evidentiality", i.e., whether there is real contemporary research on the effectiveness of a particular cleaning method or method of environmental protection. Thus, the author suggests using interactive teaching methods during the course: problem-based lectures (with errors) and practical assignments of an exploratory nature. Students who receive an education in pedagogical educational institutions in the biology specialisation should be oriented towards the formation of an eco-awareness in their professional competence [3]. The formation of eco-awareness is pursued within the higher education system and corresponds to the needs of an advanced society.

Materials and Methods

The following theoretical methods were used in the research: analysis and synthesis of specialised literature on philosophy, pedagogy, psychology; sociological, natural science and methodological primary sources; elaboration and synthesis of different viewpoints on the issue under study. The method of analogy and modelling was used to analyse the educational theories of the development of environmental and pedagogical competence of biology students undergoing the special course. Diagnostic methods include testing, interviewing, task and assignment methods. The empirical methods used in this study were: study of the work experience of educational organisations, normative and educational-methodological documentation; pedagogical observation. The experiment consisted of three stages: ascertaining, forming and controlling. Among the methods of mathematical statistics, methods of measuring students' level of environmental knowledge formation and their attitudes towards environmental issues (ranking, graphical representation of the results) were used.

The experimental base of the study was the Federal State Public Educational Institution of Higher Professional Education "Ural State Pedagogical University". The study involved a total of biology 300 students in the "Teacher Training in Natural Science" educational programme.

At the first, ascertaining stage of the experiment, the theoretical substantiation of the relevance of the chosen subject, the analysis of studies, dissertations and scientific and methodological literature of the last 3-5 years was carried out, theoretical preparation for the creation of a methodological programme was conducted during the use of which it is possible to develop of environmental and pedagogical competence of students of biological specialities. Test methods were developed to diagnose the level of students' environmental pedagogical competence and the level of motivation to participate in environmental education.

At the second, forming stage of the pedagogical experiment, 300 students of the "Biology" speciality were questioned using the tests "Level of formation of environmental and pedagogical competence", and "Motivation for the formation of environmental competence". In addition to general questions (name, age, gender, course), the methods created by the author of the study contained questions about the degree of students' interest in ecology (low, medium, high); in the test "Motivation for the formation of environmental competence" students chose the level of attitude according to which they are interested in ecological issues (attitudinal, cognitive, responsibility, prestige, duty). At this stage, the subjects were divided into two control and experimental groups, 138 and 162 people, respectively. The control group continued with the standard national curriculum, while the experimental group supplemented their training with a course on "Environmental Education for Students". The programme developed by the author consists of 14 hours, 8 lectures and 6 seminars, which are divided into 4 parts: formation of an ecological outlook, ecological education, structure of the ecological education process, methods and forms of teaching. Thus, the course was created on the basis of an integrated approach, since, at the end of the course programme, the author has identified the components of environmental and pedagogical competence that the students of the experimental group managed to form, namely, cognitive,

motivational and activity, emotional and evaluative, value and semantic, and aesthetic ones.

The third, control stage of the experiment was the final one. It was devoted to summarising, drawing conclusions and conducting a comparative analysis of the indicators of the level of interest and motivation in environmental issues between the control and experimental groups after completing the educational course "Environmental Education for Students". The results are presented using methods of mathematical statistics and graphical representation.

Results

A prerequisite for the development of environmental and pedagogical competence of biology students is the organisation of the learning process based on technologies that stimulate the student's activity in the course of practical activities. The author of the study has established that the influence of student society on any sphere of value-motivational activity gives positive results for society. Therefore, for this experiment, that was the choice of the sample category. Thus, having analysed the results of a survey on the level of formation of environmental outlook, it was found that the majority of students do not understand the consequences of damage to the environment caused by solid domestic waste (28%), consumer attitude towards environmental objects (5%), lack of understanding of the impact of unsustainable food consumption on nature (18%), cases of barbaric behaviour during outdoor activities (10%) and indifferent attitude towards animals (3%). In total, this is 54% of the students who made up the experimental group in this pedagogical experiment.

This study has shown that the development of ecological and pedagogical competence, especially among biology students, should be the basis of professional training. The results of testing the "Level of Formation of Ecological and Pedagogical Competence" are summarised as statistical data for the control and experimental groups and presented in Table 1.

Table 1. Level of formation of environmental and pedagogical competence among future biologists

| Group | Number of respondents | The level of formation | | |
|--------------|-----------------------|------------------------|--------|------|
| | | low | medium | high |
| Control | 138 | 5% | 46% | 51% |
| Experimental | 162 | 60% | 54% | 48% |

Thus, the number of students who are not interested in environmental education (low level of formation of environmental and pedagogical competence) is 33% of the total number of students; the number of students who consider the issue to be not particularly important (medium level) is 50.6%; the number of students who consider environmental issues to be important is 16.4%.

The author decided to apply the training course specifically to students with a low level of formation, since supporting the opinion of the scientific community [11;

12], they believe that a biology teacher with an unstable position on environmental issues is not sufficiently qualified. Since the teacher is inclined to motivate students from the position of their own beliefs and attitudes [13]. Having analysed the results of the test "Motivation for the formation of environmental competence", the author of the study came to the conclusion that the most common motives among students are: responsibility, prestige, duty (Table 2).

Table 2. Indicators of motivation for the formation of environmental and pedagogical competence (from the total number of students)

| Motives | Number of students (%) |
|---------------|------------------------|
| World outlook | 5 |
| Education | 11 |

| | |
|----------------|----|
| Responsibility | 15 |
| Prestige | 30 |
| Duty | 39 |

That is, the initial results demonstrate that the students of the control and experimental groups showed the same results in choosing motives for the formation of environmental and pedagogical competence of future biology teachers. The reason for this is that motivation, as a mechanism of inducement to action, is not stable and in the absence of reinforcement by natural needs and external factors, quickly changes to another [2; 14]. Thus the motives of "prestige" and "duty" predominate in an age

category such as students. As the results of this study have shown, while concern about the state of nature of our planet is relevant and trending, many people do not understand the consequences of their own impact on the environment. However, throughout the course of the study, the author observed a shift in the choice of motif towards the world outlook and educational motifs, as evidenced by the summative indicators in Table 3.

Table 3. Levels of formation and motives for the formation of environmental and pedagogical competence of future biologists after completing the course "Environmental Education of Students"

| Group | Levels of formation of environmental competence | | | | | | Motives for the formation of environmental and pedagogical competence | |
|--------------|---|--------|------|-----------------------------|--------|------|---|-----|
| | Before completing the course | | | After completing the course | | | | |
| | low | medium | high | low | medium | high | | |
| Control | 5% | 46% | 51% | 3% | 46% | 53% | World outlook | 30% |
| | | | | | | | Education | 25% |
| | | | | | | | Responsibility | 20% |
| Experimental | 60% | 54% | 48% | 1.2% | 1.8% | 97% | Prestige | 5% |
| | | | | | | | Duty | 20% |

According to the data on the percentage indicators, it can be stated that the pedagogical experiment showed a dynamic increase in the level of development of the environmental and pedagogical competence of students of biological specialities. Only a small proportion of students studying according to the basic curriculum changed their answers, the number of students with a low level of environmental and pedagogical competence decreased, and the number of students with a high level of environmental competence increased to a moderate extent. The number of students who realised their intention to participate in environmental education during the pedagogical experiment has increased, which indicates the formation of their sustainable need for environmental and pedagogical education activities as socially and personally significant. In the experimental group, the number of students with a low level of development of environmental and pedagogical competence decreased. Therefore, the positive results of the experiment are confirmed, showing that the students are concerned about the state of the environment.

The development and implementation of the course "Environmental Education of Students" has yielded positive results. Students learned to identify environmental components, became familiar with their characteristics, learned to identify the criteria by which to evaluate the effectiveness of environmental measures, gained skills in preparing and formalising research papers on environmental protection, and formed a plan for forthcoming environmental projects. All of the above has been achieved through students' internships at secondary general education institutions. During this period, certain difficulties arose in the implementation of environmental research work: shortcomings in the development of the environmental aspect of the natural science cycle, in particular, the poorly equipped laboratories for conducting experiments, and the irregularity of contests and conferences for schoolchildren to present experimental projects. A course syllabus for "Environmental Education of Students" is presented in Table 4.

Table 4. Programme of the course "Environmental Education of Students"

| Content | Number of hours | |
|--|-----------------|----------|
| | Lectures | Practice |
| I. Formation of an ecological outlook 1.1. The science of ecology, aims and objectives. Environmental laws in philosophy. 1.2. The natural and social characteristics of the Urals region. | 2 | 1 |
| II. Environmental education 2.1. The subject and object of environmental education, goals and objectives. 2.2. Environmental education at school and at home. | 2 | 1 |
| III. The structure of the environmental education process 3.1. Environmental education. 3.2. Environmental upbringing. 3.3. Environmental awareness. 3.4. Formal and informal environmental education. | 2 | 2 |

| | | |
|---|---|---|
| 3.5. Environmental education in primary school. 3.6. Environmental education in intermediate school. 3.7. Environmental education in secondary school. | | |
| IV. Methods and forms of teaching 4.1. Forms of teaching in the educational process. 4.2 Characteristics of ecology teaching methods. 4.3. Development of environmental skills and abilities in the process of studying subjects of the natural science cycle. | 2 | 2 |

The first part of the course examines the laws and concepts of ecology as a science, which include laws on the integral and interrelated development of nature, the cycles of substances in the biosphere, as well as the most important concepts of natural complexes. Next, the regional component is analysed – the natural and social characteristics of the Ural region, identifying the environmental issues of the city and districts. The second part of the course examines the functions of environmental education as a function of the development of culture and environmental literacy of the student, as well as the influence of preschool and family environmental education on the formation of the ecological culture of the future student. The third part of the course highlights environmental education, upbringing and environmental awareness and further examines the continuity of formal and informal environmental education in municipal educational institutions. In the fourth part, students get acquainted with the methodology of teaching ecology at school. Here, much attention is paid to the development of environmental skills of schoolchildren, the formation of the latter is impossible without the ecological-oriented professionalism of the future biologist, which is a fundamental component of the environmental and pedagogical competence of the teacher.

The results of the pedagogical experiment indicate the effectiveness of the methodology presented in the course programme designed to develop the environmental and

pedagogical competence of biology students in higher education institutions.

Discussion

An analysis of the state of the environment in recent years shows that the situation is deteriorating [15]. Since environmental issues contain many biological processes, an effective solution lies in identifying the causes preventing the rapid resolution of environmental issues. Among such causes is often considered a disruption of the ecological balance in nature [16; 17]. The author argues that without sufficient knowledge of the mechanisms of biological processes, humans cannot live comfortably alongside nature. The disruption of the ecological balance should not be seen as the cause of all environmental ills, it is important that the accumulated ecological problems are addressed. According to R. Sanchez-Muñoz, M. Carrió [18] it is not science that is causing environmental problems, but the incorrect use of science and its achievements, as well as the environmental illiteracy of mankind. Therefore, the creation of a course on "Environmental Education for Students" with the aim of biologising environmental knowledge has become relevant. After the course, the elements of environmental culture to be formed among students of natural sciences were identified (Table 5).

Table 5. Characteristics of the components of environmental and pedagogical competence

| Component | Environmental skills and abilities |
|---------------------------|--|
| Cognitive | Through the formed system of views and beliefs, the student shows interest in environmental objects and is focused on their preservation. To demonstrate the accumulated knowledge of science through a pronounced commitment to presenting it both orally and in printed publications. Striving for self-education and teaching this to their students. To acquire knowledge, skills and abilities about the state of modern environmental education, taking into account the regional specifics of higher educational institutions in the Urals. |
| Motivational and activity | To be able to critically analyse and systematise scientific and methodological literature of an environmental nature on the basis of one's own experience and knowledge. To exemplify eco-oriented actions: environmentally friendly behaviour to preserve nature and human beings (foresee consequences), adhering to a healthy lifestyle. To participate in research on the socio-natural state of the environment in the area of residence through discussion of environmental problems from their scientific position during discussions about regional ecology. Call for appropriate behaviour in nature. |
| Emotional and evaluative | To show compassion for negative natural phenomena; show concern for living creatures and plants, take responsibility for changing disturbances in nature. |
| Value-semantic | To disseminate environmental education on the global, regional and local levels, through participation in conferences, seminars and workshops, and to promote cognitive interests through a pro-active environmental stance at the global, regional and local levels. |
| Aesthetic | To express love for nature through a positive attitude to all forms of life, to be able to assess the aesthetic potential of an educational institution and carry out |

| | |
|--|--|
| | practical activities to enhance its aesthetic significance. Show reflection and empathy for nature and people. |
|--|--|

The core elements of these components are skills and knowledge on environmental issues. The essence of the competence approach implemented in the educational system of higher education affected the professional training of biology teachers. The term "Environmental and pedagogical competence" itself is new, requires definition, disclosure of the content and clarification of the structure, and the formation of environmental and pedagogical competence in students of natural sciences in higher education institutions is on the threshold of formation of ecological outlook in future biologists and has been the subject of study in the works of many scientists [19-21].

I. Kashafutdinova [1] notes that environmental and pedagogical intentions are the ability and readiness for activity, which is understood as creating and supporting the effectiveness of the educational sphere in environmental issues, this is the "environmental competence", which contributes to environmental education of all participants in the educational process. The student's environmental and pedagogical competence are formed from basic personal competence: basic knowledge of ecology; practical experience in solving environmental problems [22].

According to L. Kornilova [3] the basic constitution of an environmentally-conscious person consists of the ability to consciously treat the environment as a universal value; to consider the limits of socio-economic influence as one of the causes of ecological crisis; to assess one's own actions in terms of co-dependence with nature; to minimise harm to nature by one's actions or behaviour; to show empathy towards destruction in the biosphere, strive to protect; to sense the need to be included in the sphere of ecology ("communicate" with nature, enjoy the beauty of untouched nature); to have a formed worldview and attitude to the world.

L. Ivanova [23] in her research demonstrated that one of the strategies in teaching schoolchildren is the formation of conscious environmental behaviour. The relevance of education for an environmental culture is dictated by societal demand. The main thing in this direction is cultural interaction with nature, through empathy and reflection on natural phenomena. L. Ivanova [23] believes that it is impossible to separate aesthetic education from environmental education, and this can only be done with the help of extracurricular environmental education. In the course of such additional classes, it is possible to form knowledge and skills to foster a respectful attitude towards nature. The conclusions drawn from the work done by L. Ivanova [23] showed that the most effective method of engaging children in extracurricular activities in ecology was through project-based research activities. Such activity expands the range of possibilities and offers a multi-disciplinary perspective on the problem being studied. It brings out children's creativity for the purpose of pre-professional training. Extracurricular environmental education is an opportunity to diversify the general education system of a school institution by means of environmental and aesthetic education [24-26]. It gives an opportunity to master new knowledge applicable in the modern world for self-realisation and development of

ecological culture. Opportunities are also being created for the development of scientifically and creatively oriented youth, which is a necessary component of professional activity. Thus, humane and socio-cultural resolution of environmental problems plays an important role in modern education, which is what young people learn through project activities in biology classes [27-29].

In their study, T. Konchina and R. Khabibullin [13] reviewed the international activities of youth natural science organisations. Over the past 20 years, partnerships have been established and developed between the Russian youth organisation of the Faculty of Natural Sciences and various foreign organisations, in particular in Erkner, Germany. During this period, environmental camps were held for schoolchildren and students of both sides in Germany and in the Nizhny Novgorod region. Ecological camps were organised in the Kerzhensky Nature Reserve for volunteer students and schoolchildren from 12 countries in Europe and Asia. These activities have shown the importance and usefulness of international contacts in educating young people in a spirit of goodwill, tolerance and building an understanding of the commonalities between the many challenges in different societies and the need to work together to solve the many problems. These exchanges, in addition to general cultural issues, cover the problems of energy efficiency, energy and resource conservation to prevent global climate change. During their stay in Germany, students and schoolchildren have the opportunity to learn about advanced German educational technologies and the legal framework governing environmental issues. Young students and teachers keenly share their impressions, new knowledge and methodological findings at conferences held at the Natural Geography Department of the Arzamas branch of the University, the Nizhny Novgorod Computer Ecology Centre and the Youth Environmental Assembly within the "Great Rivers" Forum.

A group of scientists G. Lukhmanova, B. Sarsenbayev, M. Ozenbayev [30] were engaged in the development of a training manual for the effective organisation of educational and methodological work in higher education as a key to quality education for students. The manual covers the main trends of modern ecology and corresponds to the content of the draft standards of environmental education in higher education institutions. It introduces the laws of nature, its environmental problems today and how to avoid them in the future.

Thus, having analysed general pedagogical scientific and research sources, the author has come to the conclusion that the topic of development of environmental and pedagogical competence of future biologists has not been studied so far, although the prerequisites for this have been established. In biology today, components of ecological competence, methods of working independently with information, using research skills, creativity and ecological knowledge already exist, as presented by the author of the study. Their use is possible in the system of an integrated approach, therefore, according to the author, there is a need to develop a special course for the development of environmental competence of students for successful

activities in various spheres of life and professional activity [31-33].

According to the French philosopher P. Teilhard de Chardin [11], the disruption of stable connections in the biosphere is directly attributable to humanity. This connection is currently a powerful component of the state of the biosphere. Its disruption would create conditions incompatible with the possibility of human life on Earth. The corresponding actions of an individual and society as a whole correspond to the natural processes of overcoming the ecological crisis and preventing natural disasters. Under such conditions, environmental education has taken on special significance, aiming to change spiritual values, patterns of human consumption of natural resources and the role of human life in the ecosystem.

In the Western world, environmental problems gained the most publicity in the mid-1960s [34; 35]. Since then, a large number of environmental organisations and green movement communities have sprung up across the US, and residents have focused on environmentalisation of all spheres of their lives, reducing negative impacts on the biosphere and developing an eco-culture.

The study of A. Timofeev [12] consisted in the investigation of the features of functioning of environmental non-profit organisations in the USA, whose activities are aimed at the protection of the ocean and its coasts (using the example of public environmental organisations in the state of New Jersey). 7 out of 60 public environmental organisations monitor the ecological situation in the ocean and its coasts, which is 12% of the total number. Each of the organisations has a permanent staff. The total number of participants in these organisations exceeds 14.000. The main activities of these organisations include cleaning up beaches and embankments, decorating and modernising shorelines, preventing the exploitation of ocean resources for industrial purposes, protecting marine life and combating ocean pollution by household rubbish. In protecting the ocean and coastal environment, the greatest attention is paid to environmental education, awareness, and scientific and research monitoring.

Thus, environmental and pedagogical competence are a key component in the education of future biologists, such a trend was formed by social order due to the wide range of issues to be addressed by professionals. The competence-based approach is being introduced into the education sector in order to develop students' competence, the main components of which remain knowledge, skills, value orientations and practical experience. There is no unambiguous definition of "competence" as of today, each author supplements and expands this concept. According to the author, environmental competence should be formed as a world outlook component of each individual as part of any professional activity. In this regard, the competence approach is designed to actively promote professionalism, preservation and development of socio-cultural values.

Conclusions

The development of environmental and pedagogical competence among biology students should become an integral part of the educational system of higher education

institutions. The teacher's mission is to create conditions for the formation of an active, creative personality who strives to make discoveries, search for, and resolve emerging issues independently, taking responsibility for their solution. In such a student, environmental competence will be formed automatically based on a basic worldview. However, the realities of the science education programme suggest that lectures and seminars have their limits, fulfilling the aims and objectives necessary for further teaching in general education schools rather than in research centres. The forms and methods used in universities are not enough for the formation and development of environmental consciousness among students. In this connection, the development of the components necessary for the formation of ecological and pedagogical competence is possible only through additional courses aimed directly at broadening the environmental outlook.

Thus, the course "Ecological Education of Students" proposed by the author provides the formation of ecological culture, its integration into the system of value orientations, norms and rules in relation to nature, in particular, practical skills in environmental protection. As a result of this study, it was found that more than 50% of the students of the experimental group changed their level of environmental competence from low to high. The results of the control group also changed, during a conversation with students who watched their classmates take the course, they showed interest in the topic being studied and expressed a desire to take the course in the next semester. The students who participated in the experiment stated that the lecture material was challenging, but very interesting at the same time, offering a unique perspective on the standard education system. In the future, they would like to tackle more complex projects. The proposed topics were closely related to the environment and society. Therefore, the author of the study believes that the interests of students can be aroused and stimulated by inviting them to participate in research projects. The students noted that their motives for studying the topic of the environmental situation on the planet had changed from "duty" and "prestige" to "cognitive", incorporating the responsibility to protect the environment and solving environmental issues into their worldview system.

This course provides future biologists with the opportunity to plan their future careers with related specialities in environmental protection. It allows the development of a student's personal environmental orientation to be combined with the experience of environmental activities. Students can participate in environmental protection activities, take part in scientific research, where topical environmental issues are raised, and also be an example for the younger generation of pupils about the importance of ecological culture.

Acknowledgements

None.

Conflict of Interest

None.

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Екологічна освіта як складова підготовки майбутніх біологів в університеті

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Анотація

Актуальність. Актуальність даного дослідження визначається розвитком еколого-педагогічної компетентності в процесі підготовки майбутніх учителів біології у вищих навчальних закладах. Взаємовідносини "людина-природа" повинні бути впроваджені в систему освіти як пріоритет в ієрархії цінностей, складова різнобічного розвитку особистості.

Мета. Метою даного дослідження є виявлення шляхів та створення методики розвитку екологічної компетентності, які потребують екологічної освіти та орієнтують студентів-біологів на раціональні взаємовідносини між людиною, природою та професією вчителя біології.

Методологія. Визначення організаційно-методичних умов, що сприяють формуванню еколого-педагогічної компетентності у процесі професійної підготовки майбутніх учителів біології. Провідним методом дослідження є педагогічний експеримент.

Результати. В ході експерименту виявлено шляхи формування еколого-педагогічної компетентності студентів біологічних спеціальностей, освітня програма - "Підготовка вчителя природничих дисциплін". Визначено основні екологічні компоненти компетентності та обґрунтовано мотивацію розвитку заявленої в навчальній дисципліні компетентності. Матеріали дослідження мають практичну цінність у системі підготовки майбутніх учителів біології у вищих навчальних закладах, через екологічну освіту як студентів, так і викладачів. Їхні учні живуть у сучасному світі, у зв'язку з цим від їхньої підготовки залежатимуть умови середовища, в якому вони будуть жити.

Висновки. Ефективність таких досліджень залежить не стільки від визначеного кола проблем, окреслених у методичній літературі, скільки від внутрішньої позиції вчителя у професійній діяльності з формування екологічної грамотності учнів.

Ключові слова: екологія; компетентність; педагогіка; студенти-біологи; навчання у вищому навчальному закладі.